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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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SUN MICROSYSTEMS INC.
C/O PARK, VAUGHAN & FLEMING LLP
2820 FIFTH STREET
DAVIS, CA 95616

EXAMINER	
WALTER, CRAIG E	

ART UNIT	PAPER NUMBER
2188	

DATE MAILED: 03/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/663,604	MATHISKE ET AL.	
	Examiner	Art Unit	
	Craig E. Walter	2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-11,13-20 and 22-27* is/are rejected.

7)☒ Claim(s) *3,12 and 21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1-27 are pending in the application.

Claims 1-3, 8, 10-12, 17, 19, 21 and 26 have been amended.

Claims 1-2, 4-11, 13-20 and 22-27 are rejected.

Claims 3, 12 and 21 are objected to.

Response to Amendment

2. Applicant's amendments and arguments filed on 5 January 2006 in response to the office action mailed on 10 November 2005 have been considered but are moot in view of the new ground(s) of rejection necessitated by the amended claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-2, 4-11, 13-20 and 22-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Slaughter et al., hereinafter Slaughter (WO 01/95106 A2) in further view of Sweeney (US Patent 6,401,182 B1).

As for claims 1, 10 and 19, Slaughter teaches a method (a medium as in claim 10, and an apparatus as in claim 22) for redirecting external memory allocation operations, generated during calls by an application to external library functions, to an internal memory manager within the application, comprising:

encountering a call to an external library function during execution of the application (page 8, lines 25-27 – Slaughter discloses a virtual heap (Fig. 1a, element 110) which contains at least a portion of the runtime environment of application 104 – see also page 4, lines 1-5. Fig. 1e further illustrates how the application running within the virtual heap invokes a native method (element 158) which in turn invokes a call for native code (external library function) to access system resources page (17, lines 10-22)).

determining if the external library function can call to an internal memory allocation function within the application and if so, redirecting the call to the internal memory allocation function (referring to page 9, line 38 through page 10, line 6, the application can determine if the resources needed are currently in the in-memory heap 108, and if not, copy them into the in-memory heap from the virtual heap 110. In other words, portions of the runtime environment used to invoke the external library functions can be moved internally, within the client (i.e. JVM - element 101)). Also see page 4, lines 32-38 – the execution state can be cached from the virtual heap 110, to the in-memory heap 108.

It is worthy to note that Slaughter does in fact teach embodying his invention on a computer readable medium, as claimed by applicant (claims 10-18), on page 41, lines

1-5. Further, the mechanisms claimed in claim 10 used to execute, determine and redirect the functions (similar to the method steps of claim 1) of the claim, are taught by Slaughter, as they are inherently included within the client device (Fig. 1a, element 140), which is used to carry out his claimed invention.

Slaughter fails to teach allocating the memory using the internal memory allocation function so that memory can be allocated from the pool that is managed by the application as recited in Applicant's amendment independent claims.

Sweeney however discloses a method and apparatus for memory management in which he teaches the internal applications themselves as explicitly allocating and deallocating memory off the heap made available to them (col. 3, lines 28-44), hence eliminating the need to use an API to access and manage the memory allocation functions as presently taught by Slaughter.

It would have been obvious to one of ordinary skill in the art at the time of the invention for Slaughter to further include Sweeney's method for memory management. By doing so, Slaughter would have a means of improving memory utilization by arranging internal memory based on the alignment requirements, which would help to mitigate internal fragmentation and large headers which may pollute memory with unused data, which directly result in poor memory utilization as taught by Sweeney in col. 2, lines 35-45.

As for claims 2, 11 and 20, Slaughter teaches a method (a medium as in claim 11, and an apparatus as in claim 29) according to claim 1 (claim 10 and claim 19) wherein the task of determining if the external library function can call

an internal memory allocation function involves reading a pre-determined indicator value, which indicates whether the external library function can call the internal memory allocation function (on page 31, line 35 through page 32, line 13, Slaughter discloses a cache table used to maintain entries for each cache line contained with the virtual heap. The "type" field is used to determine which lines in the heap can and cannot be flushed, and therefore must be "pinned" in the external memory. For example, as described on page 32, lines 10-13 read-only objects are not loaded twice, hence are pinned in the virtual heap, and cannot be allocated again (i.e. paged-out to the internal heap memory 108). Depending on the status of the field, the system can determine based on the pre-determined indicator, if these portions of the memory can call the internal memory allocation function and either be paged-out for use of the application internally, or pinned in, only to reside in the external heap 110).

As for claims 4, 13 and 22, Slaughter teaches a method (a medium as in claim 13, and an apparatus as in claim 22) according to claim 1 (claim 10 and claim 19) wherein the application is a platform-independent virtual machine (page 33, lines 25-28 – Slaughter discloses different platforms (i.e. Windows, or Linux)).

As for claims 5, 14 and 23, Slaughter teaches a method (a medium as in claim 13, and an apparatus as in claim 22) according to claim 1 (claim 10 and claim 19) wherein the application runs in a single-threaded mode on a computing device (page 33, lines 25-28 – Slaughter discloses his system running on Windows 9x (i.e. Win 95), which is a single threaded OS).

As for claims 6, 15 and 24, Slaughter teaches a method (a medium as in claim 13, and an apparatus as in claim 22) according to claim 1 (claim 10 and claim 19) wherein the application runs on a memory constrained device (Fig. 9, the memory used by the application is limited to the memory as illustrated within element 140 (i.e. memory 108 and 115)).

As for claims 7, 16 and 24, Slaughter teaches a method (a medium as in claim 13, and an apparatus as in claim 22) according to claim 1 (claim 10 and claim 19) wherein redirecting the call to the internal memory allocation function involves executing an interpose function that calls the internal memory allocation function (page 10, lines 9-13 – the page-out operation is the function used to move data and code contained in the virtual heap, to the in-memory heap for the application to use and run-on internally. The page-out function is an interpose function which calls the internal memory allocation function).

As for claims 8, 17 and 26, Slaughter teaches a method (a medium as in claim 13, and an apparatus as in claim 22) according to claim 1 (claim 10 and claim 19), further comprising garbage collecting the memory allocated by the internal memory allocation function (Fig. 9, element 126, the garbage collector collects memory as required – page 34, lines 4-6).

As for claims 9, 18 and 27, Slaughter teaches a method (a medium as in claim 13, and an apparatus as in claim 22) according to claim 1 (claim 10 and claim 19) wherein the internal memory allocation function allocates memory in a heap (Fig. 9, elements 108 and 110 are allocated as heaps).

Response to Arguments

4. Applicant's arguments with respect to claim independent claims 1, 10 and 19 have been considered but are moot in view of the new ground(s) of rejection.

Per the rejection *supra* (under paragraph 3), Examiner agrees that Slaughter discusses using an API to access the system memory allocation functions per page 6, lines 2-11. Applicant further asserts that the present invention contrasts Slaughter in that the present invention allocates heap memory using an internal memory function, hence managing the memory via an application, rather than the system itself. This variation from Slaughter's teachings however has been rendered obvious in further view of Sweeney, as reiterated *infra*.

Sweeney discloses a method and apparatus for memory management in which he teaches the internal applications themselves as explicitly allocating and deallocating memory off the heap made available to them (col. 3, lines 28-44), hence eliminating the need to use an API to access and manage the memory allocation functions as presently taught by Slaughter. It would have been obvious to one of ordinary skill in the art at the time of the invention for Slaughter to further include Sweeney's method for memory management. By doing so, Slaughter would have a means of improving memory utilization by arranging internal memory based on the alignment requirements, which would help to mitigate internal fragmentation and large headers which may pollute memory with unused data, which directly result in poor memory utilization as taught by Sweeney in col. 2, lines 35-45.

5. Examiner respectfully withdraws the objection to claim 20 as set forth in the previous office action. The Examiner erroneously grouped this claim with claims 2 and 11, which were properly objected to.

Allowable Subject Matter

6. Claims 3, 12 and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter:

> As for claims 3, 12 and 21, though Slaughter teaches the use of reading a pre-determined indicator value, neither Slaughter nor Sweeney teach or suggest (either individually, or in combination) determining the value for the indicator by examining the external library function to determine whether the external library function or a function called by the external library function will call a memory allocation function, and whether there are external reference to external memory block allocated by the external library function.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

9. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig E. Walter whose telephone number is (571) 272-8154. The examiner can normally be reached on 8:30a - 5:00p M-F.

11. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (571) 272-4210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

12. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Craig E Walter
Examiner
Art Unit 2188

CEW

3/3/06

MANO PADMANABHAN
SUPERVISORY PATENT EXAMINER